# Gas Journal

VOL. 304 112th YEAR LONDON, NOVEMBER 16, 1960 No. 5072 PRICE 1/6

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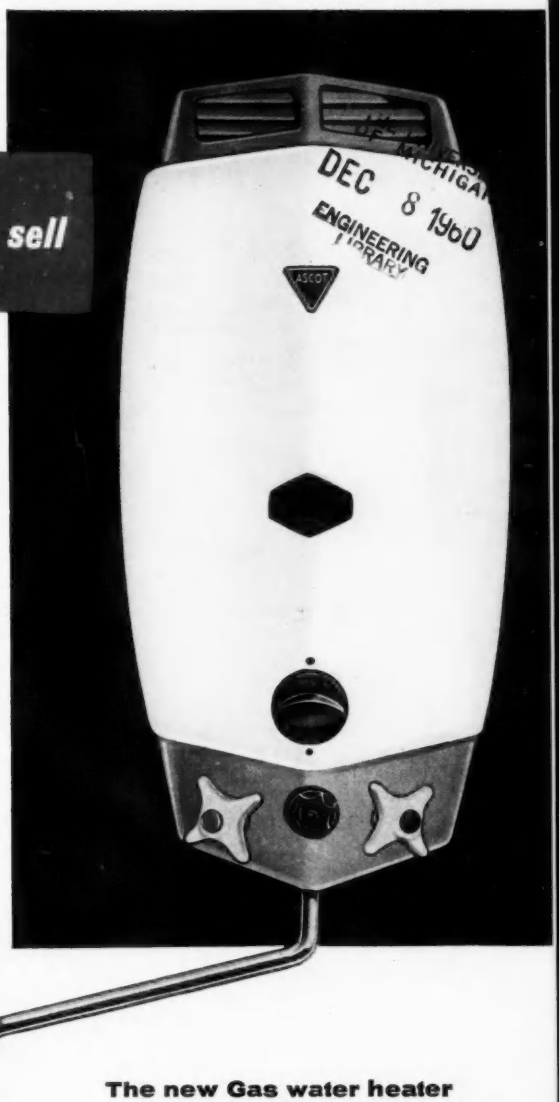

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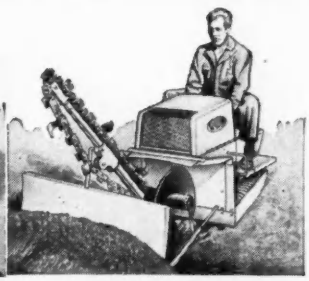

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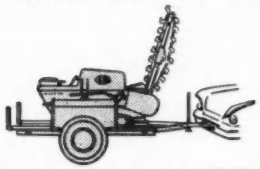

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# Gas Journal

VOLUME 304 • NUMBER 5072 • 112th YEAR

WEDNESDAY, NOVEMBER 16, 1960

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*PUBLISHERS' NOTICE, SEE PAGE 124, OCTOBER 19*

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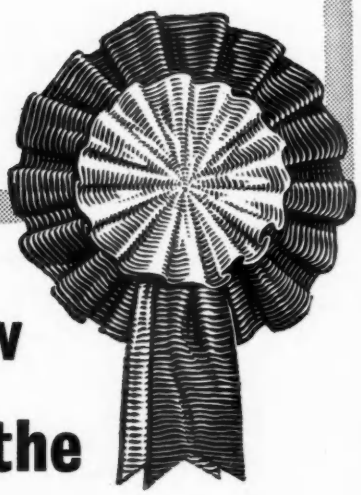

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# *A new unit for gas?*

ADMIRABLE though the idea of the Gas Council's Challenge Trophy undoubtedly is, this competition for the best sales paper has its curious, and sometimes unsatisfactory aspects. This year, however, there is nothing unsatisfactory about the winning paper, although in one respect it is certainly a little odd. The author, Mr. A. C. Clarke, is Senior Industrial Gas Sales Engineer to the Mersey Group of the North Western Gas Board, but when he wrote the paper he was Deputy Group Industrial Gas Engineer to the Wirral Group. One might not unreasonably have expected a paper on industrial gas, but not a bit of it—instead, we have a very lively paper with a purely domestic slant. Entitled 'A Spur to Advertising,' this refreshingly original work has as its main theme the suggestion of a new form of tariff based on a new unit.

Mr. Clarke takes as his starting point the adoption by the Electricity Authority of a form of two-part tariff which permitted them to use the magic statement 'You can run this unit at less than a penny an hour.' Now that the electrical hold on this gimmick is to some extent relinquished, the author suggests that the gas industry should step into the breach. 'Let there be no niceties or kid gloves about it,' he says. 'We are in direct competition; let us seize this opportunity and hit back hard without scruple or diffidence.'

The idea is to rate all appliances in terms of so many units. Anyone looking in a showroom at an appliance would therefore know immediately how much it would cost to run for an hour, and consequently its approximate running cost under conditions obtaining in his own home. The author maintains that this fact has previously been hidden in the mysteries of therms and things beyond the average ken. He believes that this system would help people to decide, and decide in favour of gas. It would also help the showroom staff to explain running costs in simple language, and 'in removing the ever present shadow of doubt that some weird and wonderful mathematical jiggery pokery is being used to bamboozle them, sell more appliances.' He thinks manufacturers would be more than willing to accept the idea.

The suggestion is that a new form of tariff be established based on a unit priced at one penny. The B.t.u. content of this unit would, of course, have to be determined, and the average income per therm it is necessary for the board to recover.

Mr. Clarke shows how, even on the North Western Board's present top tariff of 22.5 pence, it works out at 4,500 B.t.u. for 1.013 pence. So a unit could immediately be introduced at one penny.

It is suggested the actual unit could be called a Minitherm, a name which is associated with Mr. Therm, and which would readily lend itself to the continuity of cartoons. It would be referred to as a gas unit, and since it would contain considerably more than 3,412 B.t.u. and would yet cost less, it would be in a strong position to withstand any comparison or attack and to establish itself.

Since this penny per unit could not be held indefinitely against rising costs, the idea is to augment the penny with a preceding block on to which any increases would be passed. 'Price increases, or—happy thought—reduction, could be applied by varying the consumption allowed on the blocks, or merely by adding to, or subtracting from, the first charge per unit. Such additions would always be calculated accurately to give the average price required, plus a contingency margin if deemed necessary. A more simple method of dealing with fluctuations would be made possible if the value of the unit were variable. In other words, gas would always be charged at a penny per unit, but to regulate the necessary income B.t.u. content of a unit could be varied.

Mr. Clarke feels that the real advantage of the scheme is the way in which it could be tied up with a full-scale, preferably national, advertising campaign, 'for indeed it must readily be conceded that gas at a penny a unit sounds to the consumer a much better proposition than gas at 22.5 pence per therm.' To prove his point, his paper is sprinkled with humorous drawings by a colleague, Mr. W. Cartwright, showing Minitherm, a buxom blonde, in a variety of point-laden situations.

This unit business forms the central pivot of the paper, but there is much else of interest. Mr. Clarke is a deserving winner, and in putting over so forcibly an argument which, if not new, is certainly worthy of careful consideration, he has rendered the industry a service.

# Commentary on the news

## Sophisticated lady

THOSE whose interest in the 'image of gas' leads them to advocate the fashioning of a campaign to give the fuel a social uplift and a certain cachet, should take heart from the North Thames Gas Board's new series of advertisements which made its début in the shape of a half-page in the *Evening News* last week. There are three variations on the theme and we gather that the advertisements will run alternate weeks in the London evening papers, as well as appearing in 16-sheet posters on hundreds of sites and in 48-sheet posters on as many sites as possible; one-minute filmlets will also be used. The campaign is additional to the Board's normal appliance advertising.

The layout is deceptively simple. A facile brush drawing of an elegant woman cooing into her telephone is supported by a conversational fragment in which she speaks of gas as though it is a cross between the latest Balmain and the Holy Grail. The implication is that not only is gas something special, but North Thames Gas is very special indeed.

The first point which springs to mind is that this is the kind of prestige advertising which should be tackled nationally by the Gas Council. It seems ideally suited to the women's magazines (although the female form is expected to excite man appeal) and is of a type which depends for its effect on a long-term—and therefore very expensive—campaign. The value of a relatively short burst such as this is questionable, particularly as it is sponsored by only one board—although we gather that further layouts are being prepared which will introduce certain appliance features. If the Gas Council is not prepared to launch an image campaign on these lines, might this not have been a case for joint action—and shared expense—by the other London Boards? Perhaps the North Thames, rather than run the risk of 'modifications,' decided to go it alone.

Be that as it may, the layouts appeal to us very much. We have been impatiently awaiting the first sign of a campaign designed to give gas a new sophistication. This could be it.

## The soft pedal?

THERE is a possibility that the gas industry might be ill-advised in according too much publicity to the importation of such foreign fuels as gas from the Sahara. During a speech by Mr. H. A. Edkins, Assistant Sales and Service Manager to the West Midlands Gas Board, to the 16th Branch Conference of the Women's Gas Federation, the imminence of such importations was mentioned and provoked a member of the audience to ask whether the industry might 'think again and see if they can utilise English coal.'

This suggestion, economically reactionary as it is, obliges one to wonder how widely such sentiments are shared by the British public in general. One wonders whether the gas industry is alienating a section of the public by reminding them of their future plans rather too frequently. While the industry may be quite justifiably pleased with the prospects of providing cheaper gas by utilising foreign importations of fuel, and may wish to make the public aware of the future bright prospects in that direction, it should also remember that such a policy is bound to be unpopular in some quarters. Indeed, the feeling that British coal should be used before importation is considered may be more commonly held than the industry realises.

In any industry, economics must be of paramount importance, but to the public politics and patriotism may predominate. The gas industry should look at their publicity with this in mind, for it is possible that they may be soon treading heavily upon the toes of the British public's susceptibilities.

Mr. G. D. Phillips, M.B.E., Publicity Manager of the Southern Gas Board, said at the same meeting that 'the practitioners of advertising have great power.' There can be little doubt of this when one considers the space and time bought for their work. Mr. Phillips then went on to speak of the great advantages of advertising and said that the best safeguards against the 'fear of exploitation' were now coming from the advertisers, and that organisations were now trying to build up goodwill.

The importance of advertising in stimulating industry was stressed. Said Mr. Phillips. 'If we want to keep our high level of prosperity we must keep our production at a high level.' Advertising was a very important weapon in the armoury for finding new markets.

It would take a brave man to argue that advertising has no place. Most people realise that it is an important part of our society, and that although we may disapprove of the ethics of certain advertisements, the advertising man generally does a good job in bringing new ideas forward and helping to maintain that competition upon which our economy is based. However, Mr. Phillips' speech was designed to encourage his audience to discard some of their distrust of advertisements. Surely the most effective defence against the 'great power' of the advertisers is a healthy scepticism towards their advertisements.

## Golden milestone

RYE LANE, Peckham, known to the commercially minded as the 'Golden Mile', is generally accepted as being one of the most intensive trading streets in the country. And the area immediately surrounding it is regarded by the South Eastern Gas Board as providing the richest gas business in the area, if not in the British Isles. Curiously enough, however, the Board has never had a showroom in this lucrative spot—until now, that is. For on October 31 a long-standing ambition was achieved and a very spacious and handsome showroom opened its doors to the public, a showroom which exhibits a high aesthetic standard of design while conforming to the pattern of trading common to the area.

Thus the well-proportioned shop front which the Board has built has the showroom windows set back diagonally, leaving a wide forecourt where gas appliances may be displayed. The interior décor, too, strikes a happy balance between contemporary requirements and local conservatism in such matters. This results in a choice of wall-finishings which are discreetly colourful and which do not follow the rather prevalent trend of distracting attention from the appliances on display.

In most other respects the showroom is not very remarkable, although mention must be made of the versatile heating system. A gas-fired boiler at the back of the showroom heats a radiator in the showroom and one in the staff quarters. Two room heaters in fireplace surrounds are also live, as are two warmed-air units, one of which is intelligently recessed in the wall with a glass panel permitting customers to 'see the wheels go round'. The latter refinement appears to have been a brainwave of the Chairman, Mr. R. N. Bruce, and we commend the idea to others who may be seeking the best way of displaying these units.

# Protective Coatings

*A second report on the proceedings at the joint I.G.E. and S.C.I. symposium on protection of gas plant and equipment from corrosion, dealing with the protection of metal structures by the application of protective coatings.*

APART from cathodic protection, which is mainly confined to large buried or partly buried structures, the use of protective coatings for mains service pipes and works and distribution plant was the subject of several papers at the conference.

Such coatings, which are applied to structures of all sizes, ranging from small service pipes to large mains, tanks, purifiers and gasholders, include paints, metal coatings, bitumens and pitches, vitreous enamels, cement and concrete, plastics and other organic substances.

They can be applied to the surface in a variety of ways, including brushing, spraying by compressed air, or (in the case of metal coatings) by flame or high temperature processes.

## Plastic materials

Plastic materials can be used incorporated into paint media or directly in the form of sheet or tape wrappings.

Many aspects were discussed in papers by Dr. J. C. Hudson (British Iron and Steel Research Association) relating particularly to steel structures, Mr. A. D. L. Copp, Mr. W. G. Gooderham and Mr. E. Manners (North Thames Gas Board) dealing with service pipes and fittings, Mr. A. T. S. Rudram (Paint Research Station, Teddington) on paints, and Mr. R. E. Mansford (Metallisation Ltd., Dudley) on sprayed metal coatings.

*Painting.* For the purpose of protection of a surface, the term 'paint' may be taken to mean material applied in liquid form which forms a film by solidification. Such solidification is brought about by various agencies, including atmospheric oxidation, as in the case of conventional oil paints, polymerisation of unsaturated organic bodies, simple evaporation of the solvent, or solidification by cooling in the case of the use of a medium which is applied hot.

The mere interposition of a paint coating between the surface and its environment may reasonably be expected to retard the rate of ingress of aggressive materials and thus to reduce the risk or rate of attack.

Some paint films, however, are notably permeable to water and oxygen, and though useful for decorative purposes in a neutral environment, when used under industrial conditions they may be liable to corrosive attack comparable with that which might take place on unpainted structures.

In his work at the Paint Research Station, Potter showed that the barrier protection afforded to the ingress of water is roughly determined by the thickness of the paint film.

Suitable pigmentation is an important factor; the composition, physical properties, volume and packing of the solid particles are all vital factors in the resistance which a paint film can offer to the diffusion of moisture.

It has now been realised that the object of painting is to prevent the starting of attack rather than to slow down corrosion at a point where it has already started.

Recent advances in the protection of steelwork by painting now depend very largely on thick films of moisture-resistant coatings applied to chemically clean steel.

The thorough cleaning of such steel is particularly essential in cases where the paints do not incorporate special substances for chemical inhibition of attack.

In general, for exposed steel structures in this country, it is inadvisable to apply a paint film less than 5 mils (.005 in.) thick.

This represents four coats of brush-applied paint. For severe conditions, *e.g.*, exposure to sea water, etc., this must be considerably greater, and in all cases due allowance must be made for the roughness of the surface when paint is applied to grit-blasted or metal-sprayed steel, since the priming coat may have to fill up depressions in the surface which may reduce its covering power to about half its value on smooth metal.

The method of preparing the steel surface to receive the paint can do more than anything else to make or mar the success of the operation.

## Remove scale

Structural steel leaving the steelworks carries a thin layer of oxide (millscale) produced by oxidation of the hot iron in air. Such scale is friable, and is not a satisfactory subsurface for painting upon. Consequently, complete removal is necessary before painting can commence.

In the past, it was common practice to attempt this by weathering, which often did more harm than good by loosening the scale without completely removing it, and at best it merely substituted a less harmful but still undesirable layer of rust for millscale beneath the paint.

The best practicable means for obtaining a clean surface are by blasting or pickling. Experimental results obtained at Sheffield for a four-coat painting scheme applied to eight different structural irons and steels gave the follow-

ing figures (in years) for average duration of protection: Weathered 2.3, pickled 9.6, sand blasted 10.3.

As regards the painting itself, the composition of the priming coat is probably the most important item. It should have inhibitive properties, *i.e.*, be of a type that tends to repress rusting by chemical means.

The old-fashioned red lead in linseed oil paint is a good example of this. A protective paint system may therefore employ coatings which, by virtue of their high electrolytic resistance prevent attack, or may make use of inhibiting constituents in the paint, which are often rich in metal, and capable of exerting cathodic protection. Many paints comprise both types of ingredients.

Good design at the drawing board stage can do much to add life to the structure by attention to those details which assist in allowing the paint completely to cover the surface.

Many corrosion troubles with old structures are traceable to lack of imagination on the part of the designers in this respect.

## *Provide drainage*

Nooks and crannies where corrosive dirt and moisture can collect should be avoided as far as possible, and where necessary, for instance, in horizontal beams and channels, drainage holes should be provided.

Ease of access to facilitate the maintenance of paint coatings after erection is a vital feature. Such details as back to back angles a fraction of an inch apart constitute a serious corrosion hazard, and are undesirable.

Although there are excellent British Standard Specifications relating to paint composition, the opinion was expressed in the discussion that it appeared desirable to formulate a specification to be used at the tender stage of contracts, which would have regard to the design of structures in relation to their painting and maintenance requirements.

Without such an agreed specification it might well be that the shoddy contractor would get the contract by reason of low first charges, to the ultimate detriment of the job.

Dr. Hudson's paper provided much material for discussion. Regarding preparation of steelwork, he called attention to the occasional use of copper-bearing slag for blasting treatment. This should be avoided on account of the likelihood of causing galvanic reaction with the iron by particles of embedded copper. The presence of soluble salts, notably ferrous sulphate, on the surface of the structure where the steel is temporarily exposed in the unpainted state to a sulphur-laden atmosphere, may provide a surface upon which paint may not properly adhere. In such circumstances, a thorough washing with water before applying the paint was recommended.

## *Paint thickness*

As regards paint film thickness, the recommended amount should apply to all parts of the surface covered.

This is often not the case, especially on the edges of plates and rolled sections, where it may be only 1 mil thick while the main body of the surface is covered to, say, 5 to 7 mils.

Mr. T. A. Dick (West Midlands Gas Board) referred to æsthetic reasons for painting industrial structures in certain areas. Gasholders, for instance, might need re-painting every three years for æsthetic reasons alone, and, in his opinion, the preparation of the steel surface may not be so important as in other cases where such considerations did not apply, and where longer periods of protection were required.

Other speakers did not agree on the desirability of a three-year programme, and suggested seven years as a suitable period.

It seems obvious, in the case of holders, that the æsthetic aspect is of importance, since holders of conventional types are outstanding features of the landscape, and, with the advent of more integration of gas production and distribution this is likely to be more so.

New holders tend to be larger and, because of grid distribution schemes, are more conspicuous in rural and residential areas.

Against this, the future will see the installation of more high-pressure holders, which being much smaller will not be so likely to disfigure the scenery.

Nevertheless, our present large holders will be with us for many years, and should be made as little offensive to the eye of the beholder as is practicable.

*Metal coatings.* Protective metal coatings for iron and steel may be applied either by hot dipping or by metal spraying. The former process is naturally limited to plates, sections or assemblies that can be got into the bath in one piece or in several stages.

This puts a practical limit of about 60 ft. on the length of a hot galvanised article. Even so, it is possible to galvanise fairly large girders or beams.

Zinc is the most common metal used for hot dipping, although other metals are used on a limited scale.

The metal-spraying processes which became important in the 1920's have the advantage of being applicable to structures of any size, and allow of the choice of a much wider range of metals.

Metal coatings on steel are protective without paint, although in some cases, only to a limited degree, and it is common practice to use paint as an additional protection.

By using a metal such as aluminium or zinc as a coating between the steel and the ordinary paint film, cathodic protection is assured by making use of the covering metal as a sacrificial anode.

## *Deferred painting*

There are cases where deferred painting of a metal coating may be admissable or even advantageous. Whereas with a sprayed metal coating it is generally advisable to paint immediately after the coating has been applied, this is not always so with a hot-galvanised coating, as, for example, a roof, since hot galvanised surfaces are generally improved by some preliminary weathering, and it may often be permissible to defer painting until several years after erection.

The life of zinc coatings of not less than 2 oz. of zinc per sq.ft. until the first signs of rust appear and painting becomes necessary, may vary from five to 20 years according to conditions.

As regards metal coatings deposited on the surface by spraying, three methods are in use, molten-metal, powder and wire spraying.

These terms explain the manner in which the metal to be deposited is fed to the spraying tools.

The use of molten-metal processing is now confined to special purposes, but the other two methods are in general use for the application of protective coatings.

Most of the examples quoted in the paper by Mr. R. E. Mansford, and referred to below, are of coatings that have been applied by wire spraying equipment, in which the coating metal, in the form of wire, is continuously fed into an oxygen/fuel-gas flame.

When molten, the metal is drawn off the wire, and projected on to the prepared surface by a stream of compressed air.

Any metal which is obtainable in the form of wire or

rod and which can be melted in the spraying equipment, can be deposited as a sprayed coating.

For reasons of economy, comparatively thin coatings are generally used when the object is protection of steel from corrosion, and in thickness below 10 mils (.010 in.); the choice of coating metal is limited in most cases to metals anodic to steel.

The electrochemical series indicates four common metals having normal electrode potentials which render them anodic to steel: Aluminium, zinc, cadmium and magnesium. All four metals are easily applied by wire spraying.

Although preferential attack of the coating metal is necessary to afford adequate protection, the rate of corrosion must not be so high as to shorten unduly the life of the coating.

The choice of metals for the bulk of work protected by metal spraying lies between aluminium and zinc.

Under mild corrosive conditions, aluminium tends to build up a protective oxide film which has the effect of raising its relative potential.

This oxide film may be maintained to such a degree that the aluminium does not corrode at a rate sufficient to confer protection on the steel.

## *Zinc coating*

Thus, in rural atmospheres, and in waters of high electrical resistivity, zinc is often superior to aluminium as a coating.

On the other hand, zinc tends to form soluble corrosion products if used in an industrial atmosphere containing sulphur compounds.

These products are readily leached by rain falling in an acid atmosphere, and, by constantly exposing a fresh metal surface, the life of the coating is reduced.

The method of surface preparation is by gritblasting. Adhesion of the coating may be regarded as of a purely mechanical nature. The surface must therefore be free from grease, rust, and millscale, and must have a 'keyed' or angular contour to receive the sprayed metal.

The use of an angular abrasive permits of the formation of such a surface. Round steel shot of the type used for peening is, for this reason, not suitable.

Although it is often desirable to apply paint as a barrier coating on sprayed metal, a painting system designed to be applied directly on to a steel surface is unlikely to prove the best scheme for application to sprayed zinc or aluminium.

## *Surface toughness*

In sprayed form, these metals provide coatings quite different in nature from zinc and aluminium in other forms; they are porous to some extent, and have a natural surface toughness, so that no special precautions are necessary to obtain good adhesion of the paint.

These characteristics must also be borne in mind when specifying the paint, for thin paint with low solid contents may be almost completely absorbed by sprayed coatings.

The paint films must have a total thickness sufficient to cover the 'peaks' in the sprayed metal. Compatability of the paint with the sprayed metal, and, what is more important, with any corrosion products that may form on the sprayed metal, is essential.

Paint media are as important as pigment in this respect. Rigid specification for a suitable paint for sprayed metal is impossible, since so much depends on environment.

A system that behaves well in an industrial atmosphere may break down rapidly under immersed conditions.

As a general indication, lead paints (particularly red lead in linseed oil) and graphite paints, are not favoured for application to sprayed zinc and aluminium; zinc chromate, red oxide, and mixtures of these two pigments, in alkyd or phenolic media, give very good results, as priming paints for the two commonly sprayed metals. Normally, two paint coats are necessary.

The British Standard Specification on sprayed metal coatings for protection against atmospheric corrosion (B.S. 2569, Part I) gives .003 in. of sprayed zinc and .004 in. of sprayed aluminium as the minimum coating thicknesses where no painting is to be carried out, but allows a reduction to .002 in. minimum if paint is to be subsequently applied. Thicker coatings are applied according to the severity of the conditions.

When considering the advantages of a sprayed metal coating, it should be remembered that it is not only the increase in the period between repaints that is an asset, but, in addition, there is much less work in cleaning down prior to repainting. Aluminium has been the metal most used for protection of structural work in gasworks. Gas main trestles and bridges, gantry cranes and coal truck tippler units are some of the items treated in this way.

In some cases, phenolic type varnishes have been used for sealing. Chimney stacks at many gasworks have been sprayed with .006 in. of aluminium, and this treatment is widely recognised as the best available for protecting their external surfaces, subjected as they are to the combined effects of heat and atmospheric attack. A waste heat boiler stack at the Dudley gasworks was sprayed with .006 in. of aluminium in 1955, and has since had no further treatment. The treatment was both internal and external.

Several gasholders have been successfully treated by zinc spraying, sometimes as complete units, and sometimes in special parts only, as, for example, in the water-seal areas.

## *Service pipes*

*Protection of gas service pipes and fittings.* The paper by Copp, Gooderham and Manners described improvements in the protection of gas service pipes and fittings used in the North Thames Gas Board's area. Service pipes are now pickled, phosphated, primed and painted internally, and then coated and wrapped with bitumen or coal tar enamels, two layers of glass fibre tissue and an outside layer of paper.

The materials are put on with a fixed head machine under careful control. Specifications for the materials and for the coating and wrapping have been prepared and are given as appendices to the paper. Much of the improvement in protection has been achieved by the adoption of spark-testing of the finished product.

This is now a standardised routine procedure and its success has only been made possible by close collaboration between manufacturers, users, and testing laboratories. The T.I. high frequency tester made by Edwards High Vacuum Ltd. has been found to be a very satisfactory instrument for this work.

The ideal pipe coating should adhere closely to the metal, should not crack or soften, should remain chemically inert and possess high electrical resistance.

It should be impenetrable to water and other liquids and should be capable of resisting soil pressure and bacterial attack. All tubing must be thoroughly cleaned from rust, dirt, or oil. With new tubing, this is best done by pickling, phosphating, drying and immediately painting. With old tubing, grit blasting may be necessary.

Bitumen or coal tar enamels to a strict specification should be used in the coverings. Two layers of glass tissue within the bitumen or tar are essential to give strength to the coating to reduce any further flow of the enamel, to

squeeze out bubbles of gas and air and to ensure evenness of coating.

It is essential that the glass tissue should be easily 'wetted' with the hot enamel, and that the latter should bleed through the tissue to form a perfect bond. The glass tissue should not be prone to cleavage.

In the course of the discussion, reference was made to types of glass fibre material which might prove faulty through the presence of water-soluble constituents (size, etc.).

The possibility of breakdown of epoxy-coal tar coatings was also mentioned. This might come about by trapping of the solvent under the coating, which could lead to faults in the protective layer.

After the tubes have been prepared for coating and wrapping by being passed through the pickling, phosphating and water-washing tanks, they are dried with a hot-air dryer. While still hot, they are coated externally with a priming coat. The primed tubes then pass along a drying rack, and, after drying, are painted internally by a rotating brush which applies red lead paint.

Coating and wrapping may be done by hand or by a fixed head machine. In hand wrapping, the tube is rotated by power, and the wrapping holder is also moved along by a power drive.

The coating of the tube is carried out by hand, using scoops from the bath of hot bitumen below. The reel of glass tissue is passed through the hot bitumen, and fed spirally on to the tubes.

Two separate layers of glass tissue are applied. Finally, the tubes are dipped in lime-wash or rolled in sand, to prevent them sticking together.

In another type of partly motorised plant, the tube is rotated, and a small bitumen tank is power driven along the length of the tube.

Fixed head machines have been in use for a long time for large diameter pipes, but it is only comparatively recently that they have been used for service pipes.

In these, bitumen is supplied by a ring main from heated and thermostatically controlled storage tanks containing the hot material. Descriptions of the use of these machines can be found by reference to I.G.E. Comm. Nos. 548: 1959 and 518: 1958.

When completed, the coated and wrapped tubing must be carefully handled in order that faults may not develop by breakage of the protective material. Special provision is therefore made to avoid rough handling in transport and storage.

Differences of opinion exist as to the relative merits of natural bitumen (asphalt) and coal tar enamel. It is of interest to note that, up to the present, coal tar enamel has been preferred in America, notwithstanding the large quantities of asphaltic products available, while in this country bitumen has been preferentially used for pipe protection.

Dr. D. McNeill (Coal Tar Research Association, Report No. 0238, June, 1959) summarises the present position as follows:

'Coal Tar enamels have, it is claimed, the advantages of: (*a*) Lower moisture absorption, which is particularly important when anti-corrosion measures include cathodic protection; (*b*) better adhesion; (*c*) resistance to bacterial attack and attack by plant rootlets; (d) resistance to solution by petroleum products; (*e*) resistance to attack by common chemicals. They are said to have the disadvantages of: (*a*) A tendency to flow at high temperatures and to become brittle and fracture at low temperatures; (*b*) they are less flexible; (*c*) they are unpleasant to apply, particularly in the factory, due to lachrymatory fumes they evolve when heated.'

The North Thames Gas Board is changing its policy from using screwed joints to using couplings with rubber or rubber-like jointing rings. Whichever type of joint is made, it must be protected.

Previously the Board has used petroleum jellies, but cases have been known when the petroleum jelly has dissintegrated after a few year's use and has failed to afford proper protection.

In consequence, the Board is using greater quantities of pressure-sensitive P.V.C. tapes. These are bought to a specification, based on Specification J.10 of the British Standards Institution, except for the test of adhesion-to-self.

This latter is extremely important, since, unless the tape sticks firmly to the pipe, letting in no air or moisture, the joint is doomed to corrosion, which might occur very quickly.

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# *Gasification of American lignite*

THE gasification of American lignite is taking place in a new pressure gasifier being developed at the Grand Forks research laboratory of the United States Bureau of Mines. The gasifier, which may be the forerunner of plant producing chemicals and a substitute for natural gas, is stated to have made several successful test runs.

In the gasifier, steam and oxygen react with char, a partly carbonised lignite, to evolve producer gas at high overall efficiences. The fixed-bed gasifier has for the first time in the United States, been operated at temperatures high enough to discharge the ash as liquid slag. Generators at present in use discharge ash in solid form, and in order to prevent the formation of large lumps of fused ash, must be operated at temperatures below the melting point of the ash.

Feed and slag removal sections of the gasifier must be constructed to withstand very high pressures, and to this end experiments are continuing for several months in order to develop process variables. It is intended to undertake trials using raw lignite instead of lignite char, to avoid the intermediate step. The gasifier will then be tested at pressures of from 370 to 450 p.s.i. using lignite char; operating efficiencies in low pressure runs at 80 p.s.i., have been found to be 'appreciably greater' than those obtained in similar generators under commercial operation.

The high quality gas generated at Grand Forks contains hydrogen, carbon monoxide, steam and carbon dioxide. It is therefore much like water gas produced by normal coke and steam methods, the proportions of the constituents varying with pressure, temperature and rate of feed.

After treatment, a mixture of carbon monoxide and hydrogen is obtained, synthesis gas, from which synthetic fuels and chemicals may be derived. It can also yield methane, the main constituent of natural gas which is used as a fuel in many parts of the United States.

# The derivatographic investigation of gas purifying materials—*Concluded*

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THIS exothermic effect, exhibited at temperatures above 300°C, is also to be observed in some of the purifying materials investigated showing the presence of $Fe(OH)_3$. In samples containing greater quantities of aluminium than is to be found when aluminium and iron salts are precipitated together, this exothermic peak is substantially less marked—or does not occur at all. From the theoretical point of view it is interesting that at this point corresponding to the sudden exothermic effect, the T.G. curve exhibits a sudden drop, *i.e.* a sudden decrease in weight; it is also clearly indicated by the sharp peak at 320°C. of the D.T.G. curve. According to an X-ray investigation by T. Horváth, the sample shows only indistinct, diffuse reflections, when heated to 300°C, but at 330°C it already exhibits a crystal structure characteristic of hematite. The co-precipitated $Fe(OH)_3 + Al(OH)_3$ can not be identified either by the A.S.T.M. X-ray card collection or on the basis of other line systems. Both the original sample, precipitated at room temperature, and its fractions, ignited at different temperatures (125°C and 225°C) suggest a structure still unknown. It is to be assumed, therefore, that they form mixed hydroxyl gels or mixed crystalline structures. All these experimental results verify the complexity of the structure of gas purifying materials.

The evaluation of the experimental results obtained is rendered more difficult by the fact that the decomposition peak of the hydroxyl groups, splitting off at low temperatures, coincides with the peak of the release of water bound by absorptive forces. Caution is therefore necessary when determining the water content of purifying materials and care must be taken if the splitting off of the hydroxyl groups is to be prevented.

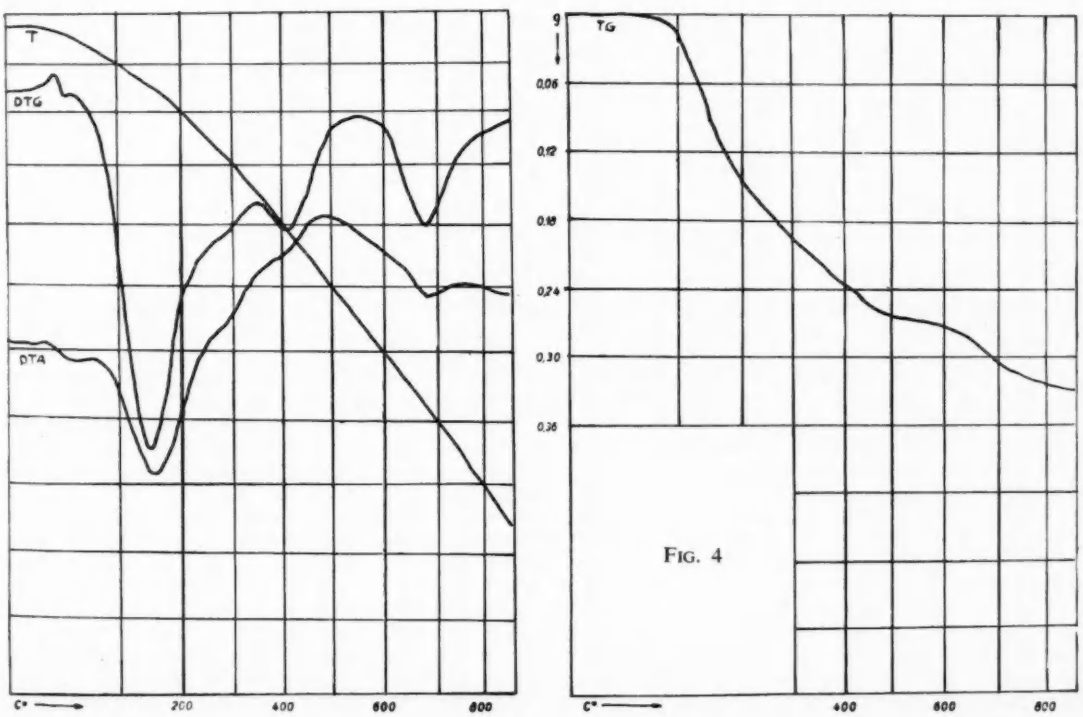



FIG. 4

TABLE 3.

| No. | DERIVATOGRAPH | | | |
|---|---|---|---|---|
| | Peak of the D.T.G. curve | | Peak of the D.T.A. curve | |
| | Temperature | Height | Temperature | Character |
| | °C. | % | °C. | |
| 1. | 120<br>250<br><br>470<br>560<br>790 | 368<br>446<br><br>53<br>47<br>56 | 130<br>260<br>325 | –<br>–<br>+ |
| 2. | 80<br>250 | 176<br>452 | 100<br>255 | –<br>– |
| 3. | 100<br>250<br>640 | 560<br>inflection<br>44 | 120<br>260<br>640 | –<br>–<br>– |
| 4. | 110<br>205<br><br>550<br>680 | 262<br>462<br><br>40<br>72 | 125<br><br>290<br><br>680 | –<br><br>+<br><br>– |
| 5. | 110<br>250<br>710 | 500<br>inflection<br>68 | 130<br><br>650 | –<br><br>– |
| 6. | 110<br>275<br>320<br>480<br>640 | 349<br>306<br>inflection<br>43<br>58 | 120<br>280<br>330 | –<br>–<br>inflection |
| 7. | 110<br>320 | 720<br>274 | 115<br>325 | –<br>+ |
| 8. | 120<br>265<br>430 | 490<br>111<br>157 | 135<br><br>420<br>520 | –<br><br>–<br>+ |
| 9. | 130<br>240<br><br>370 | 446<br>inflection<br><br>186 | 145<br>240<br><br>370 | –<br>inflection<br>–<br>inflection |
| 10. | 45<br>145<br>290<br>415<br>680 | 40<br>314<br>inflection<br>120<br>116 | 50<br>150<br>290<br>415<br>690 | –<br>–<br>–<br>inflection<br>– |

The author then describes in more detail the results of her experiments carried out on individual samples.

*1. Lux (Fig. 5).* The weight of the sample taken was .9902 g.; the D.T.G. curve exhibits two decomposition peaks. The peak occurring at 120°C ends at 190°C, and the second occurring at 250°C ends at 380°C. When projecting these temperatures on the T.G. curve, quantitative data may be obtained of the OH groups which are present in different forms of binding.

Up to 190°C Lux showed a decrease in weight of .080 g., from 190°C to 380°C, .076 g. and from 380°C to 700°C, .033 g. On the basis of the decrease in weight certain conclusions may be drawn about the compounds present. First, the presence of $Fe(OH)_3$ and FeO(OH) is to be assumed. The presence of $Fe(OH)_3$ is also indicated by the exothermic effect shown above 300°C in the D.T.A. curve.

When ferric hydroxide is converted to hematite, three molecules of water are split off from two molecules of ferric hydroxide:

$$2\ Fe(OH)_3 - 3\ H_2O = Fe_2O_3.$$

From a quantity of substance, corresponding to twice the molecular weight (213.8 g.), 54 g. of water (3 $H_2O$) is released. In the case of the weighed-in sample of .9902 g. this would amount to a decrease in weight of .2501 g. The decrease in weight found experimentally does not attain this value.

When hydrated ferric oxide is converted to hematite, one molecule of water is split off from two molecules:

$$2\ FeO(OH) - H_2O = Fe_2O_3$$

This is to say, that the decrease in weight of the substance, corresponding to twice the molecular weight (177.8 g.), is 18 g. For the weighed-in sample this would be equal to a decrease in weight of .1003 g. The decrease in weight found experimentally exceeds this value. Assuming Lux to contain one molecule of FeO(OH) for each molecule of

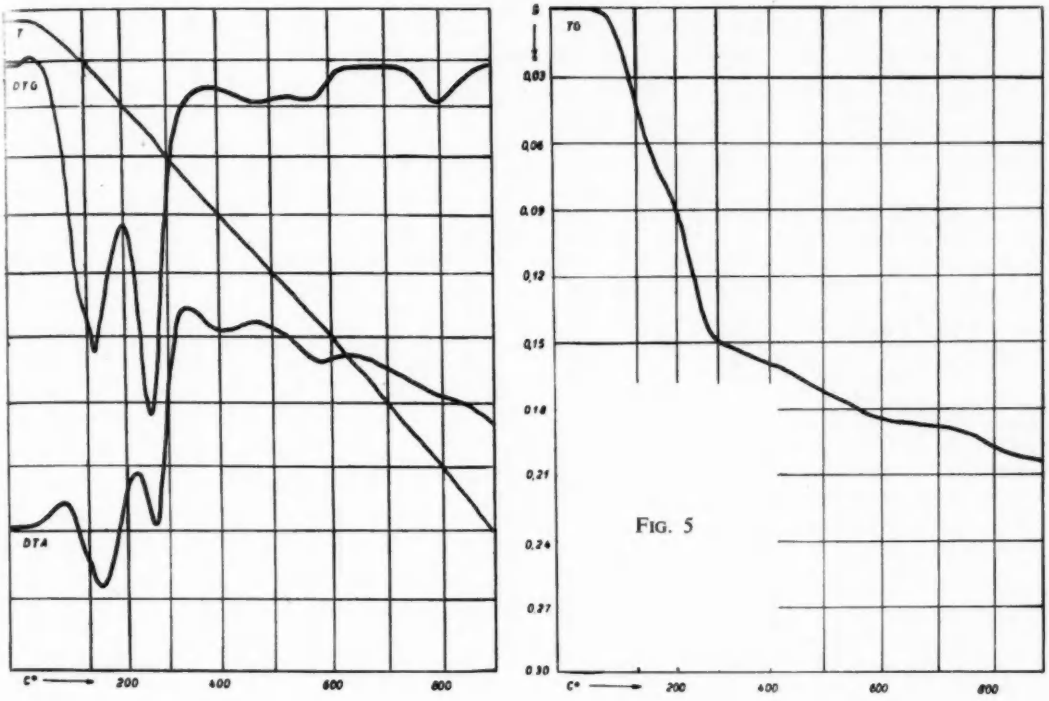
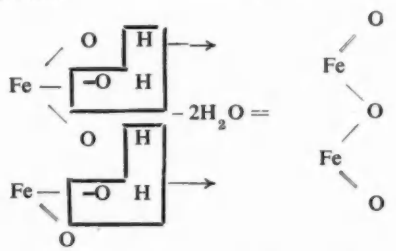



FIG. 5

$Fe(OH)_3$, then:




Thus the decrease in weight of 195.8 g. of the substance would be 36 g., corresponding to a .1821-g. decrease in weight for the sample. The decrease in weight found experimentally agrees approximately with this value. Not only are the values of the decrease in weight in accordance with this assumption, but so also are the following experimental results. In accepting the above supposition, two molecules of water have to be split off for the conversion to hematite.

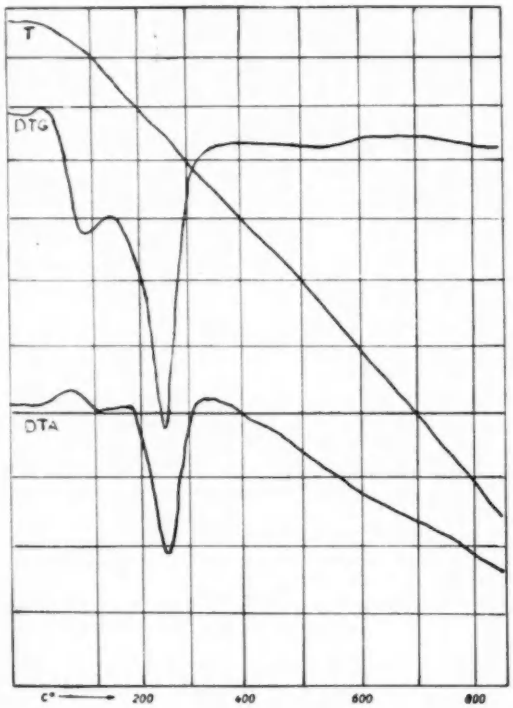
The splitting off of each of the two water molecules, however, is not a completely identical process. The splitting off of one molecule of water may occur within the molecule, and it is evident that a lower temperature (110°C) may be sufficient to accomplish it. For the splitting off of the other molecule of water two FeO(OH) molecules have to meet, and it is reasonable to suppose, that a higher temperature (250°C) is required for this purpose. The two peaks on the D.T.G. curve for Lux, or rather their different temperatures, are readily explained by this assumption. The assumption is further supported by the fact, that the decreases in weight, corresponding to the two peaks, are also nearly identical, since, both of them correspond to the splitting off of one molecule of water. In these computations the water content of the Lux, which was low according to analysis, was not taken into consideration.

*2. Zeleznik (Fig. 6)* is a bog ore of inferior quality. A quantity of .9896 g. was weighed out for the investigation. The D.T.G. curve exhibits two main peaks and a smaller peak. The peaks, occuring at 80°C, 250°C and 540°C, and at 150°C, 400°C and 600°C, respectively. When projecting these temperatures on the T.G. curve, the following decreases in weight were found: Up to 150°C, .0285 g.; from 150°C to 400°C, .0765 g. and from 400°C to 700°C .015 g. Considering the total decrease in weight, this is the closest approximation to the decrease in weight of pure FeO(OH). If the peak at 80°C is attributed to the release of water bound by absorptive forces, which is probable because of the low temperature of the peak and the absence of the exothermic effect on the D.T.A. curve characteristic of $Fe(OH)_3$, this indicates a water content of 2.88% of the material. The weighed-in sample thus corresponds to .9611 g. of dry material. If this is assumed to consist of FeO(OH), in accordance with the above calculations, the decrease in weight of the substance should be .0973 g. The decrease in weight found experimentally up to 700°C is .0915 g., which is in good agreement with the computed value.

The absorption of hydrogen sulphide by Zeleznik-assumed to consist of FeO(OH) was found in four saturation tests—with revivifications in between—to be 51.11 g. on a sample 100 g. of the dry material, or in round numbers 50 g.

Lux assumed to consist half of $Fe(OH)_3$ and half of FeO(OH), has taken up in four saturation experiments 101.9 g. of $H_2S$ on a sample of 100 g. of dry substance, or in round numbers 100 g. of $H_2S$.

On the strength of the assumed composition of Lux, 25 g. out of the 100 g. of $H_2S$ taken up, can be apportioned to the hydrated ferric oxide, and 75 g. to the ferric hydroxide. Consequently it may be concluded, that 100 g.



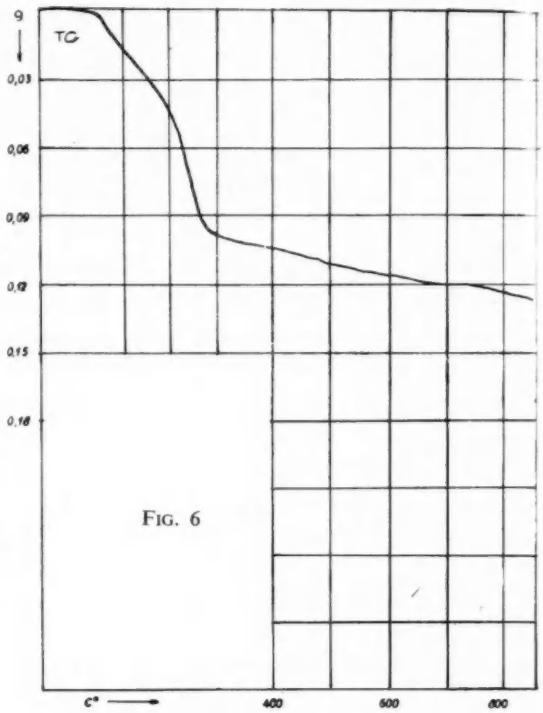
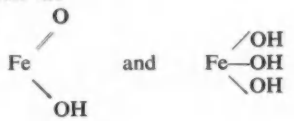
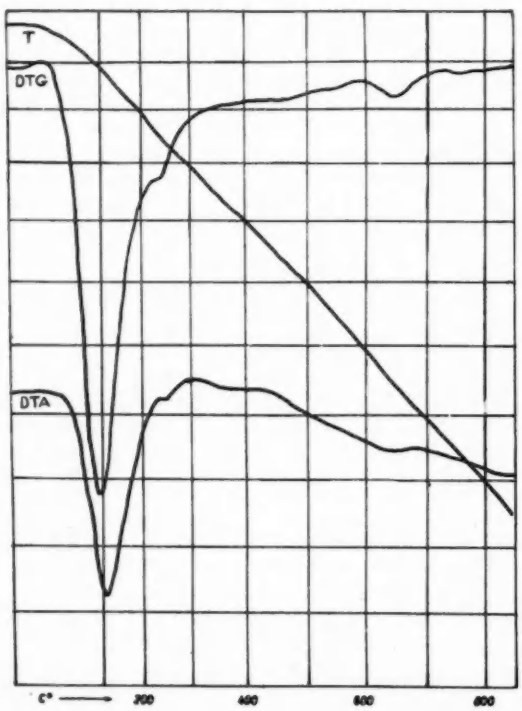




FIG. 6

of ferric hydroxide can take up 150 g. of hydrogen sulphide. This means, that the




can absorb in four saturations 50 g. and 150 g. of $H_2S$, respectively, this ratio of 1 : 3 being proportional to the hydroxyl groups contained in the two absorbents. This result indicates, that the capacity of the substance to take up $H_2S$ is dependent primarily on the number of the hydroxyl groups. The number and the type of bond of the OH groups are in their turn strictly dependent on the



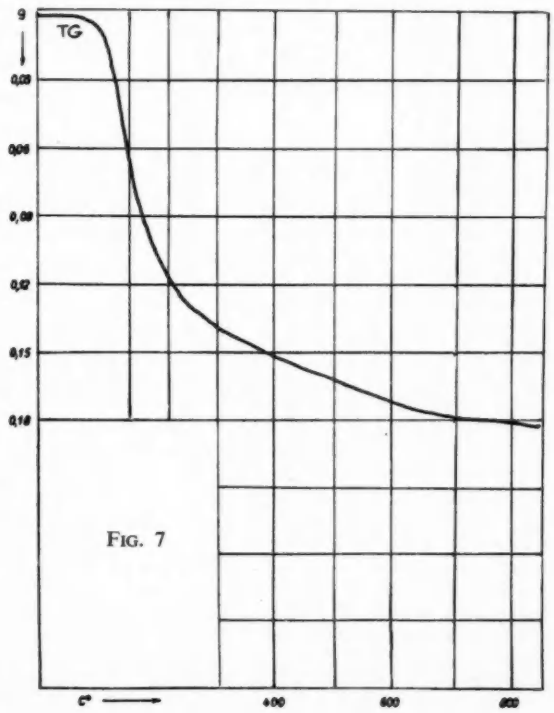
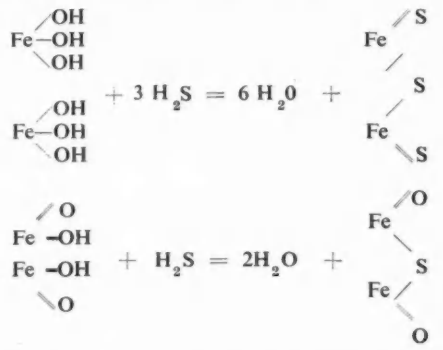




FIG. 7

conditions under which the substances were precipitated, in fact on the formation of the absorbent substances.

The differing ability of various materials to take up $H_2S$ can be explained by the above results.

The suggested mechanism of the reaction of $H_2S$ with $Fe(OH)_3$ and FeO(OH) is as follows:



Accordingly, 213.8 g. of $Fe(OH)_3$ combine with 102 g. of $H_2S$, and consequently 100 g. with 47.8 g., whereas 177.8 g. of FeO(OH) combine with 34 g. of $H_2S$, and therefore 100 g. with 19.12 g. This allows certain conclusions to be drawn from the results of the first $H_2S$ saturation about the composition of the purifying material. The capacity of Zeleznik to take up $H_2S$ was found to be 21.12 g. in the first saturation experiment, which was approximately equal to the calculated figure of 19.12 g. for FeO(OH). The hydrogen sulphide absorptive capacity of Lux at the first saturation is 37.8 g., in fact within the two values computed above.

From these experiments and calculations, conclusions on the structure of the other materials investigated may be drawn.

*3. An experimental material (Fig. 7).* For the recovery of the aluminium content of red mud, obtained in the Bayer process, the substance was decomposed by Le Chatelier's method. The material under investigation was obtained in this way and .9866 g. was weighed out. A decrease in weight of .1266 g. was obtained for the first peak at 100°C, ending at 240°C, and a further decrease in weight of .0182 g. from 240°C to 340°C, with the end of the inflection at 250°C. If the first peak is attributed to $Fe(OH)_3$, and the second, *i.e.* the inflection at 250°C, to FeO(OH), as before, $Fe(OH)_3$ participates by .5012 g.—50.8%—in the weighed sample, and FeO(OH) by .1798 g.—18.2%. Since 100 g. of ferric hydroxide can take up 150 g. of hydrogen sulphide in four saturations and FeO(OH), 50 g, the hydrogen sulphide absorbed by this material is:

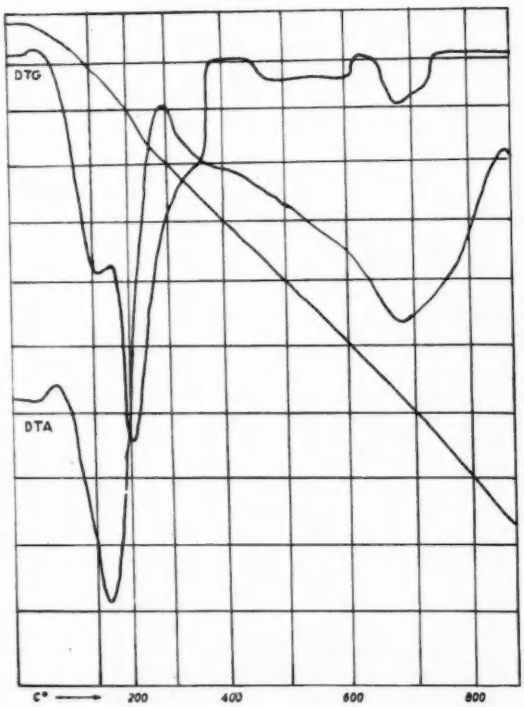
150 multiplied by 0.508 = 76.2 g. and
50 multiplied by 0.182 = 9.1 g.
a total of 85.3 g.

The computed value is thus in good agreement with 87.02 g., the value found experimentally. In the first saturation the material should theoretically absorb

47.8 multiplied by 1.508 = 24.28 g.
19.1 multiplied by 0.182 = 3.48 g.
a total of 27.76 g. of $H_2S$.

The value obtained experimentally—25.31 g.—is somewhat lower. According to the above calculations, however, the $A1_2O_3$ content of the material, as given by the analytical difference, is actually present in this form, since, if otherwise, it would influence the decreases in weight.

*4. Danish bog ore (Fig. 8).* A sample of .9894 g. was weighed out and used in the investigation. Contrary to the other materials investigated, the D.T.G. curve of the derivatographic analysis showed peaks at 110°C and 205°C. Up to 150°C a decrease in weight of .102 g. was found, and from 150°C to 280°C, .168 g. These high values for the decrease in weight indicate the presence of $Fe(OH)_3$, a supposition further supported by the marked exothermic



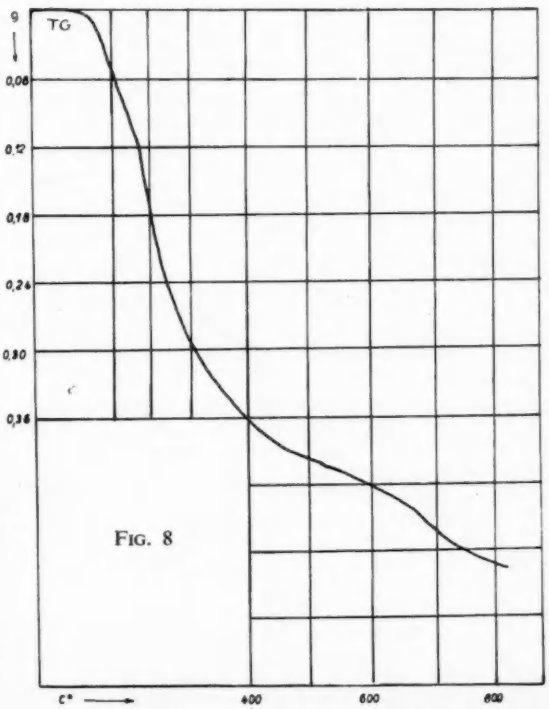
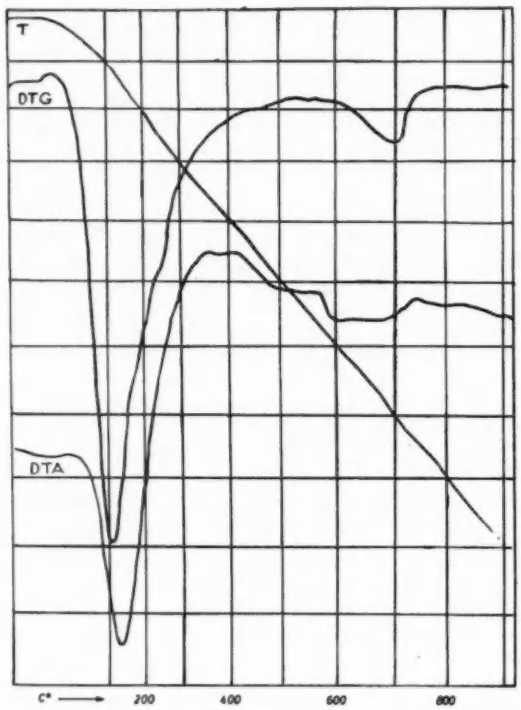




FIG. 8



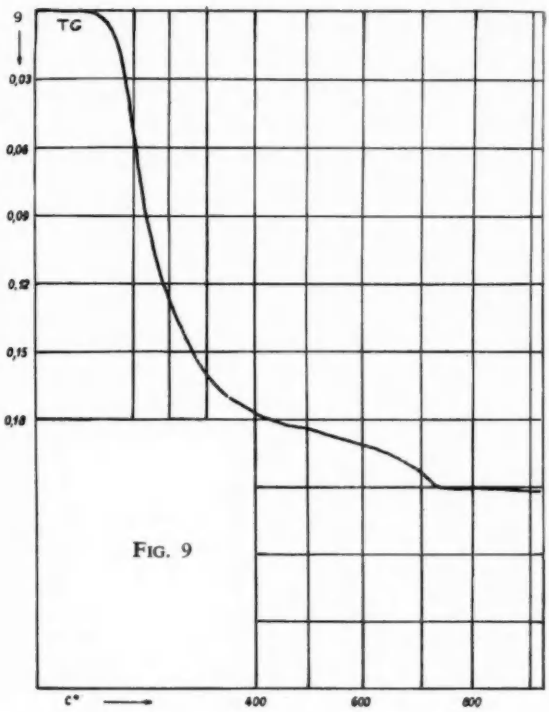




FIG. 9

effect exhibited at 300°C by the D.T.A. Curve, which is well known to be characteristic of $Fe(OH)_3$. Calculations, however, on the basis of these values for the decrease in weight, show a substantially higher proportion of $Fe_2O_3$ in the material than the 39.50%, found by analysis. This indicates that, in addition to water bound by absorptive forces the ferric hydroxide gel contains water molecules bound by stronger forces.

The 39.5% of $Fe_2O_3$, found analytically, corresponds to 52.8% of $Fe(OH)_3$. The capacity to absorb hydrogen sulphide in four saturations is accordingly 150 times .528 or 79.2 g. This calculated value is in good agreement with the experimentally obtained value of 78.6 g. Since the ferric hydroxide contained in the sample should give a decrease in weight of .132 g., while the decrease in weight obtained experimentally—.270 g.—was nearly twice this value, it is reasonable to suppose that in the Danish bog ore a further water molecule is split off for every water molecule of the ferric hydroxide, bound by stronger forces than the absorptive water. The *p*H of the Danish bog ore is in the acid range, as against those of the other purifying materials investigated—iron of valency VI.

*5. Purifying material obtained from the coking works of Pécs. (Fig. 9)* The weight of the sample was .9870 g.; the decrease in weight up to 200°C., the end of the peak at 110°C, was .126 g. This corresponds to .4989 g. of $Fe(OH)_3$, or 50.5% of the original sample, and should in four saturations give a hydrogen sulphide absorption of 75.8 g.; a value of 71.3 g. was found experimentally. Since the theoretical amount of $H_2S$, taken up by 100 g. of $Fe(OH)_3$, is 47.8 g., then 50.5 g. should take up 24.1 g. of $H_2S$. The $H_2S$ taken up by the sample in the first saturation was 23.9 g. so the experimental and computed values are in excellent agreement. The inflection of the D.T.G. curve at 250°C., and the respective decrease in weight of .034 g., exhibited on the T.G. curve from 200°C. to 300°C. cannot, however, be attributed to iron compounds. The mass also contains, according to analysis, 20.15 g. of $Al_2O_3$, so it may be assumed that this inflection is due to AlO(OH). Since 120 g. of AlO(OH) releases on decomposition one molecule of water, the above decrease in weight corresponds to .2265 g. of AlO(OH), *i.e.* to a content of 22.9% of AlO(OH) in the material, equal to 19.49% of $Al_2O_3$. This is a very good approximation to the value of 20.15% of $Al_2O_3$, found analytically.

*6. Synthetic gas purifying material. (Fig. 10)* This sample was obtained from the Budapest gasworks. On account of its very low iron content of 9.57%, it is no longer regarded as a gas purifying material. This is confirmed by its very low absorption of hydrogen sulphide, a total of 12.1 g. in four saturations. A sample of .9965 g. was weighed out for the experiment.

The D.T.G. curve exhibits two peaks, one at 110°C., the other at 275°C. The decrease in weight up to 190°C., corresponding to the first peak, was .06 g., while that corresponding to the second peak from 190°C to 300°C., was .0518 g. If the first peak is attributed exclusively to ferric hydroxide, and the second to hydrated ferric oxide, the values of the iron content and the hydrogen sulphide absorptive capacity are so high that they are not in harmony with the results of analysis and testing. The opposite approach was also followed in the investigation of the structure of the material, by starting from the supposition that half of the $Fe_2O_3$ content is present in the form of $Fe(OH)_3$, and the other half in the form of FeO(OH), as it is in Lux. This assumes a content of 6.40% of $Fe(OH)_3$ and 5.32% of FeO(OH) in the material. This proved to be right. The hydrogen sulphide absorptive capacity—in four saturations—calculated on this basis is:

1.50 multiplied by 6.40 = 9.60 g.
.50 multiplied by 5.32 = 2.66 g.
Total 12.26 g.

Experimentally, a hydrogen sulphide absorptive capacity of 12.1 g. was found, which was in good agreement with the computed value. If the proportions of ferric hydroxide and hydrated ferric oxide assumed above are correct, then a quantity of .0638 g. of $Fe(OH)_3$ and of .0531 g. of FeO(OH) respectively will be contained in the sample of the substance weighed out. This quantity of ferric hydroxide corresponds to a decrease in weight of .0161 g., and that of FeO(OH) to a decrease in weight of .0054 g. This means that a decrease in weight of .0439 g., at the first peak and .0464 g. at the second is not to be attributed to the iron content. If the excess decrease in weight is attributed to $Al(OH)_3$, and AlO(OH) respectively, the excess decrease in weight at the first peak would correspond to 12.72% of $Al(OH)_3$,—equal to 8.32% of $Al_2O_3$—and that of the second peak to 31.04% of AlO(OH)—equal to 26.38% of $Al_2O_3$. Since the $Al_2O_3$ content, found experimentally, complies with the value calculated from AlO(OH), it is reasonable to conclude, that as in Lux, aluminium is present in the form of AlO(OH) in this material too. The excess decrease in weight of the first peak obviously indicates the release of moisture.

These experimental results and calculations show that by comparing the data of the derivatographic analysis with those of chemical analysis and hydrogen sulphide absorptive capacity tests, conclusions may be drawn about the structure and composition of gas purifying materials. Experimental results can be interpreted on this basis.

The data obtained from these investigations show that the degree of hydrogen sulphide depends primarily on the number of hydroxyl groups, contained by the iron compounds. The splitting off of the hydroxyl groups of ferric hydroxide occurs at the same temperature as the release of water bound by absorptive forces, which stresses the need for caution when determining the water content of gas purifying materials.

The results of this investigation should encourage the development of a method based on the colorimetric determination of the iron content and the loss on ignition of the air-dried material—OH groups—for the evaluation of gas purifying media in the plant.

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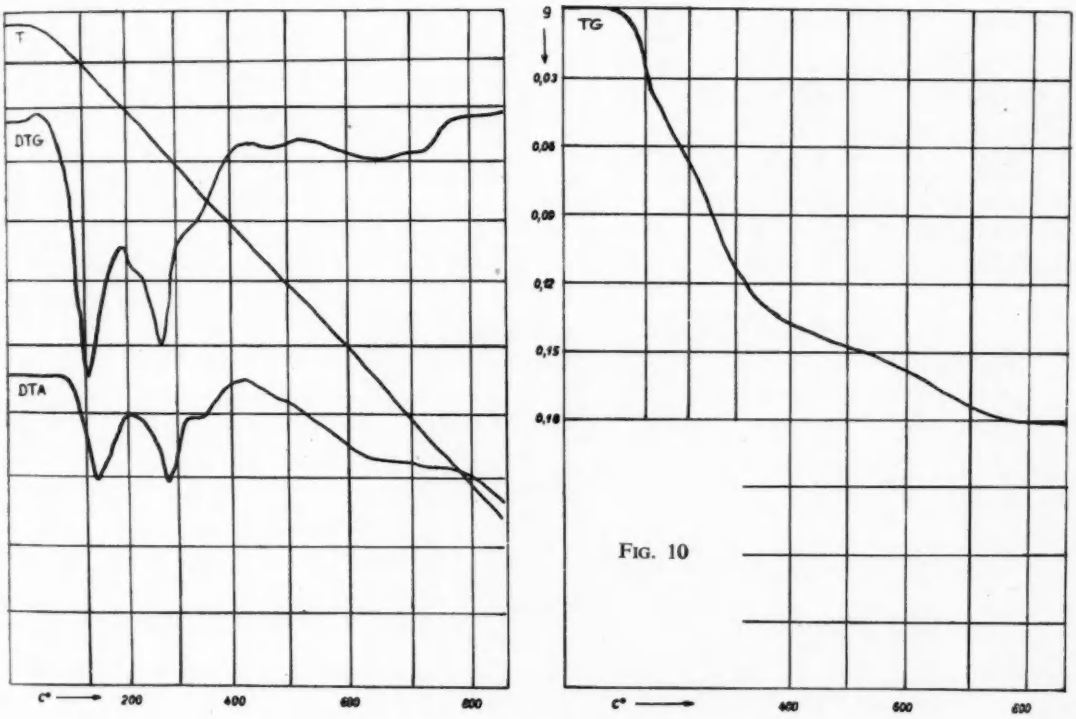



FIG. 10

## SHELL-AND-TUBE HEAT EXCHANGERS

THIS much-needed British Standard specifies minimum requirements and gives guidance for the mechanical design and construction of shell-and-tube heat exchangers, a specialised form of pressure vessel widely used in industry for such purposes as heating, cooling, evaporating.

Information supplied by the Tubular Heat Exchanger Manufacturer's Association (T.E.M.A.) and the American Society of Mechanical Engineers, has been used.

Copies may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 20s.

**NEWS SUPPLEMENT**

## 'PRESERVE FREEDOM OF ACTION'

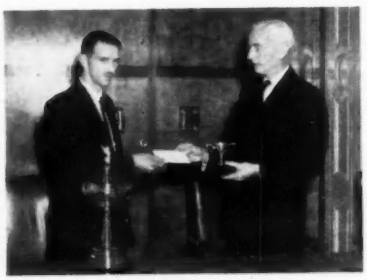
*LORD CITRINE, speaking in the Lords debate on the Addres referred to the fact that the Minister of Transport was to requi the Transport Commission to submit to him all schemes over £250,00 and said that he thought all this struck at the root of the competenc of the Commission, indeed at the viability of the public Corporations.*

*He asked Lord Mills to use his influence and his power to try t preserve the independence and the freedom of action of the publi corporations within the broad setting of their constitution.*

# HOUSE DEBATES PUBLIC INVESTMENT

# *METHANE: 'No import proposals made to me' says Fuel Minister*

DURING the debate in the House of Commons last week following the presentation of the White Paper on Public Investment in Great Britain, the Chancellor of the Exchequer, Mr. Selwyn Lloyd, who introduced the motion, said that although the gas industry is not expanding significantly, it is developing new methods of production. The products of the nationalised industries were basic to the functioning of the economy, but this did not mean that every scheme for improving or expanding their facilities must be sacrosanct.



*Sir Henry Jones, Chairman of the Gas Council, presenting the Council's Salesmen's Challenge Trophy to Mr. Allan C. Clarke, Senior Industrial Gas Sales Engineer of the Mersey Group of the North Western Gas Board. His paper, entitled 'A Spur to Advertising', was illustrated by Mr. W. Cartwright.*

There had to be a criterion for deciding which of the many possible projects were put into the programme. That criterion must be that investment should be expected to justify itself by its return in higher production or reduced costs.

Mr. Nicholas Ridley, Cirencester and Tewkesbury, referring to economic factors, said the gas industry would probably take less coal. The industry had already found it could buy methane abroad and bring it here and use it more cheaply than gas made from home-produced coal.

The industry was also toying with the idea of making gas out of imported oil.

He would like to know whether the Government would allow these developments because they had a pretty big bearing on the future of the coal situation in the country.

*The Minister of Power, the Hon. Richard Wood, with left to right: Mr. T. E. Lee, a fitter at the East Midlands Gas Board, Cleethorpes; Mr. P. J. Smith, district fittings foreman, Harlow, Eastern Gas Board; and Mr. J. Austin, a distribution foreman, Hither Green Depot, South Eastern Gas Board, after he had presented them with British Empire Medals, on behalf of the Queen, at Lancaster House, London. The Medallists and their wives then went to Murdoch House, where they met and were congratulated by Sir Henry Jones, M.B.E., Chairman of the Gas Council, who presented them with small mementos of the occasion.*

### Smokeless fuel

Mr. Ridley also said that at Stoke Orchard, in his constituency, there was a very interesting laboratory where they were trying to turn low-grade small coal into briquettes of smokeless fuel.

He much questioned whether there was sufficient investment in this branch of the coal industry.

Speaking last for the Government on the first day of the debate, the Minister of Power, Mr. Richard Wood, said the total programmes of the fuel and power industries for next year showed a slight increase over the probable out-turn for this year, largely because the increased requirements for electricity outweighed the reductions for coal and gas.

Speaking of the planned rate of increase of the gas industry, he said that the

(Continued on page 331)

# E. Midlands to start new non-domestic two-part tariff

A NEW optional, non-domestic two-part tariff, which has been specifically designed to make the price of gas in the East Midlands even more competitive with other fuels for the commercial and small industrial user, was introduced on November 14 by the East Midlands Gas Board.

This tariff is available to users of gas in all types of premises other than the private house or flat, and comprises a commodity charge in respect of the gas registered by the meter and a quarterly standing charge.

The standing charge is fixed by the Board for each consumer's premises and is based on the maximum hourly gas rate in B.t.u. of all gas appliances in the premises to which the tariff is to apply. The maximum demand is charged for as follows:—

A minimum charge of £2 10s. a quarter for the first 50,000 B.t.u. or part thereof.

A charge of £1 5s. a quarter in respect of each additional 25,000 B.t.u. or part thereof for all appliances except those which are used for space heating purposes having a central boiler with pipe work and radiators or a heating unit with ducting. The standing charge for these appliances will be at the rate of 12s. 6d. a quarter for each additional 25,000 B.t.u. or part thereof.

The consumer must agree to take gas under this tariff for at least 12 consecutive months and following this period may give three months' written notice of termination.

No change will be made to the standing charge during the first 12 months and after this period the standing charge may be reviewed either at the request of the Board or of the consumer.

If the standing charge has to be refixed due to an increase or decrease in the maximum demand it will again remain in force for a period of not less than 12 months from the date of any review.

The consumer has the option to transfer from the two-part tariff to the general purpose tariff at any time after the first 12 months period has expired provided that three months' notice in writing is given to the Board.

The actual running costs of the new tariff are the same as for the Board's domestic two-part tariff—1s. 1d. a therm for Zone 1 which includes Sheffield; 1s. 1½d. a therm for Zone 2 which includes Nottingham; and 1s. 2½d. a therm for Zone 3, which includes Leicester.

The purpose of the new tariff is to make available a reduction in the price of gas to those consumers who make the fullest use of the appliances installed. Beyond a certain point the greater the use of these services the cheaper becomes the cost of supply.

The Board, in making a supply available to any commercial or industrial premises, will provide the necessary manufacturing plant, storage capacity and distribution system, to meet the maximum demand for gas at any time of the day or night.

Mr. R. S. Johnson, the Board's Chairman, gave these details to the East Midlands Gas Consultative Council in Nottingham.

The price increase proposals throughout the Board's area were also accepted by the Council, which means that the average domestic user in Zone 1 will have to pay 6d. a week more; in Zone 2, 5½d. a week more, and in Zone 3, 4d. a week more.

Other consumers such as industrial and commercial users will pay approximately 7½% more in Zone 1, 5% more in Zone 2 and 2½% more in Zone 3.

The quarterly standing charge for consumers who buy their gas on the optional two-part tariff will be increased by 6d. a week. The price of gas actually used on this tariff is unaltered in Zones 2 and 3 but goes up by ½d. a therm in Zone 1.

# Bradford's first smokeless zone gets under way

THE first smoke controlled area in Bradford has come into operation at Little Horton, but there are still many of the 5,555 premises in the area that have not yet been converted to smokeless fuel.

The Bradford *Telegraph and Argus* quotes an official of the Health Department as having said that the Corporation had made 1,626 grants for fireplace conversions in the area, but because so much work was still in progress, it was not possible to give an accurate description at the moment.

People leaving the matter until the last minute had inundated the gas and electricity boards, and plumbers were rushed off their feet.

It was appreciated that many people living in rented houses outside Bradford, had experienced difficulties. Although the official closing date for conversion grants had passed, the Health Department had served statutory notices on those who had failed to comply with the conversion order, and if they took steps at once, grants could still be provided. It would now be an offence to burn fuel giving off black smoke in Little Horton.

# —And new tariff for the Southern Area

DETAILS have been announced of a new gas tariff for the Southern Gas Board's area.

The main changes are: An increase of 1½d. per therm in the Portsmouth, Southampton and Isle of Wight areas; an increase of 1d. per therm in the Bournemouth, Reading and Oxford areas; a decrease of 1d. per therm in Banbury and North Dorset.

Typical domestic customers in the most adversely affected areas will pay not more than 6d. per week extra.

Customers on the domestic two-part tariff will pay a commodity rate, which is 8½d. less than the published price for their area, instead of 7d. less as at present. Along with commercial and industrial users, for whom the credit block rates have been adjusted, they will find the new tariff more attractive to extra gas consumption.

# Plea for a 'get-together'

Dearer oil and not enough coal was the situation visualised for 1970 to 1980 by Sir Campbell Hardy, the new director of the Coal Utilisation Council, when he spoke to the Coal Industry Society in London.

Sir Campbell said that Britain should reduce its dependence on unreliable sources of oil.

'Internecine warfare between oil and solid fuel gas goes on, and there is no common front of the solid fuel interests.' The time has come for them to get together and iron out their differences.

# *GAS COKE PRICE RISE FOR SCOTS*

The Scottish Gas Board has announced that as a result of the recent increase in coal prices, gas coke prices have been increased by 6d. a hundredweight.

The new winter prices for gas coke delivered by the Board now varies from a minimum of 9s. 4d. a hundredweight or 183s. a ton in most South and Central Scotland districts, to 10s. 5d. a hundredweight or 205s. a ton in the more northerly areas.

# SCOTTISH BOARD PROJECTS WILL COST £½ MILL.

NEARLY half a million pounds is being expended by the Scottish Gas Board on a number of new projects within the area.

One item of £65,000 represents expenditure on the provision of butane storage and vaporisation plants at Granton (Edinburgh), Provan (Glasgow) and Aberdeen. It is explained that as a result of the agreement reached in respect of a supply of butane at favourable prices, considerable financial benefits can be obtained by the use of butane for enrichment. The figures given represent the total cost and the work has been completed at the three centres.

An agreement has been reached with the Scottish Division of the National Coal Board for supplies of methane to be made available from Valleyfield Colliery in Fife. It has therefore been decided to lay a grid main from the colliery to the Dunfermline gas works. The scheme will cost £60,000, and after allowing for the repayment of capital charges on the main, the cost per therm of this gas is lower than the cost of gas production at Dunfermline.

### Grid projects

Grid main projects totalling £98,500 in other areas aim at permitting the cessation of gas production at the Callander, Lanark and Carluke works.

The biggest single item is of £185,000 for laying eight miles of 12-in. diameter steel main, and six miles of 8-in. steel main from Denny to Armadale, together with the necessary governors and instrumentation. This section of supergrid main has been advanced from 1964 so that a grid supply can be given to Armadale works in 1961, made necessary by the additional gas demand which will come from the British Motor Corporation's factory at Bathgate.

News of these projects was given to members of the Scottish Gas Consultative Council at a meeting in Edinburgh on October 26.

*At the Wales I.G.E. annual meeting. From left to right, are: Mr. Gwilyn Rees, R.T.B. West Wales section; Mr. T. Mervyn Jones, Chairman, Wales Gas Board; Lt. Col. L. G. Bevan, President, Swansea Chamber of Commerce; Mr. S. L. Wright, Gas Engineer and Planning Officer, Wales Gas Board; Mr. A. H. Norris, Assistant Secretary, Minister of Power; Mr. E. M. Edwards, Deputy Chairman, Wales Gas Board.*

# GAS LOOKS UP IN NEW ZEALAND

THERE are already signs of a better spirit in the gas industry in New Zealand, says the first report of the New Zealand Gas Council for the year ended March 31, 1960.

Undertakings are seeking to promote sales and assist in their own rehabilitation, says the Chairman, Mr. H. Watt.

Gas production figures were encouraging during the year. Production had declined steadily until the lowest point was reached in 1954. It then remained practically steady for two years before improving.

For the year ended December 31, 1959, production advanced to 5,609 mill. cu.ft., a 2.4% increase over the 1958 figures and an 8.2% improvement over 1954.

# *AMALGAMATION APPROVED*

The terms of the amalgamation of the Institution of Civil Engineers and the Institution of Municipal Engineers have now been approved by the Councils of the two Institutions and embodied in a formal agreement.

# £450,000 GAS CLEANING PLANT ORDER

*FOLLOWING a £1½ mill. contract from the Appleby Frodingham Steel Company (branch of the United Steel Companies Ltd.) last month for sinter machines, Head Wrightson Iron and Steel Works Eng. Ltd., a subsidiary of Head Wrightson & Co. Ltd., have now been given an order exceeding £450,000 for a gas cleaning plant, capable of cleaning 8,100,000 cu.ft. per hour of blast furnace gas.*

*The plant will consist of two 18ft. diameter washers and four 23 ft. 6 in. diameter precipitators, together with ancillary equipment and instrumentation.*

*The plant is expected to be completed by the end of 1960.*

# Showrooms closing

Four showrooms in Ayrshire are being closed by the Scottish Gas Board. They are at Main Street, Neilston; High Street, Lochwinnoch; Main Street, Kilbirnie, and North Street, Dalry. The district will in future be served by mobile showroom.

*Mr. H. W. Grover, who recently retired from the position of Senior Industrial Gas Officer of the North Thames Gas Board, returned to Murdoch House to receive a presentation from the Industrial Gas Development Committee to mark his services with that committee. Mr. Grover is third from the right; Mr. R. F. Hayman, Chairman of the Committee, who made the presentation, is on Mr. Grover's right. Mr. Grover joined the Committee in 1953.*

# Road Tar Association meets for dinner

THE annual dinner of the British Road Tar Association was held at Grosvenor House, Park Lane, London, W.1., on Tuesday, November 1, with the President, Sir Henry Jones, M.B.E., who is Chairman of the Gas Council, in the chair.

Sir Henry, proposing 'The Guests,' reminded those who did not come every year that the British Road Tar Association was a joint effort between producers—the gas industry, and the coking industry, which included the National Coal Board.

Sir Henry said that a big part of the work of the Council was technical. They had other work, but if they were to time the council meetings they would find the technical discussions dominated the work and took up a very large part of it. He believed that would continue. They had a close relationship with the Road Research Laboratory and that helped them to be quite certain that they were on the right lines.

### More roads

Their ambition was to see more roads built in this country and more tar used on those roads. If they put a gallon of tar on a road he reminded them that someone somewhere would have carbonised between one and two cwts. of coal to produce it. They would be supporting a home industry and getting a service as cheaply as they could get from any other source.

Sir Henry told how, as a young man, he went from Essex to Scotland and back by car. He referred to the improvements in the roads and the development of by-passes in those 34 years, expressing the hope that his children would see even more progress than he had seen.

### Fine roads

He said, the M1 was a very fine road and, motoring down it when it was quite new, he was staggered to see how many vehicles could not stand the pace. A little song kept going through his brain: 'Tarred shoulders are hard shoulders' and he thought the tune that went best with it was 'Black Bottom.'

Responding for the guests, M. André Rumpler, President, Association Internationale Permanente des Congres de la Route, expressed his pleasure at being asked to make the reply on behalf of the guests.

Referring to the happy relations he had always had in the past with the British Road Tar Association, before he ceased, at the beginning of this year, to be the Director at the French Ministry of Public Works responsible for the regulations on co-operation between the French ATIGED and the British tar producers, he said there was an affinity between them which probably resulted from the fact that he began his career as Ingénieur des Ponts et Chaussées at a time when tar was by far the most-used binder. He had been one of the first supporters of tarmacadam.

France wished to sustain the commercial trade relations which she had enjoyed for many years with Britain for tar imports.

Sir Henry Jones then said that at a recent council meeting they had made a presentation to Mr. J. Davidson Pratt, C.B.E., former chairman of the Association, but they had not time to have prepared a part of the presentation, which consisted of a book with an expression of esteem which they hoped would be a memento. It was really a presentation for the council.

Mr. Davidson Pratt had been concerned with tar for 32 years and was the full-time chairman of the British Road Tar Association from July, 1957, to September, 1960.

He was part-time chairman of the Association for a great many years before becoming full-time chairman. His character was known to a good many of them and, Sir Henry said, knowing him much less than some of them did, he would say that there was a very charming personality beneath the Aberdeen granite.

He presented Mr. Davidson Pratt with the book and expressed the hope that he would have a long and happy retirement.

Mr. Davidson Pratt said he appreciated the presentation very much and that which the council had made just over a month before. He wanted to say to those who represented Ministries and organisations which used the admirable product with which they were concerned that the British Road Tar Association was grateful for their interest in tar problems.

# Three major contracts for H. & G.

THREE major international contracts, together worth several million pounds, have been awarded to Humphreys & Glasgow Ltd., the British contracting engineers. They are for plant in India, Central America and Australia.

A fourth contract awarded to the company recently was for the design of a nuclear grade carbon dioxide plant in Western Europe.

The Indian contract, itself stated to be worth 'several million pounds,' is for the design and construction of a chemical plant.

In Central America, Humphreys & Glasgow will be working on a new tetra-ethyl-lead plant, where 'anti-knock' compounds will be produced. From the city of Melbourne, the company has received a £A1,000,000 order.

The chairman, Mr. Ambrose Congreve, is making a tour which will take him to Osaka, Japan, where he will see preliminary work on another contract—the biggest catalytic oil-cracking plant of its kind in the world for making town gas.

At Singapore, Mr. Congreve will be the guest of Lord Selkirk, U.K. Commissioner for Singapore and South-East Asia. The firm have just completed a fourth catalytic oil-cracking unit there, making Singapore one of the first examples of a community having its entire gas supply derived from oil.

# LIQUID METHANE—continued from p. 326

figure was about 6% in sales between 1959 and 1965.

He said: 'I was asked about the importation of liquid methane.

'I have already undertaken to give to the House, if and when the time comes, the full facts, and to discuss with it any proposals made to me, but I should like to take the chance of stating that I have had no proposals made to me.

'If and when proposals to import liquid methane do come to me, I shall look at them and come to a conclusion in the light of all the factors of which the House is aware, and, of course, in the light of its effect on the coal industry.'

Discussing Mr. G. Nabarro's suggestion that there should be a Nationalised Industries Bill, Mr. Wood said: 'I think that what he would like to see is an Estimates procedure for the nationalised industries. I suggest that an Estimates procedure may be perfectly suitable for a Government Department but it is wholly unsuitable for a commercial undertaking.

'What I think we are trying to establish in our continual attempts in feeling our way is the best possible balance between, on the one side, commercial freedom and, on the other, Parliamentary control.

'I am convinced that the balance is about right, because, with our borrowing power legislation, our procedure allows us to look at each industry about every two or three years.

'My last point concerns what control over a nationalised industry the Government should exercise.

'Clearly, the prime responsibility must rest with the nationalised industry itself. It has its obligations to make ends meet, taking one year with another, and its investment programme must enable it to fulfil those obligations.'

## CORRESPONDENCE

# SULPHUR EXTRACTION

Dear Sir,

In the 'GAS JOURNAL', Vol. 303, No. 5063 of September 14, 1960, you have published an article by Mr. G. J. Middleton, entitled 'Sulphur extraction from spent oxide by solvents' which, on page 396, contains some errors.

It is not true that the German extraction plants, using perchlorethylene as the solvent, have been closed down for some time.

The plants at Trier and Heidelberg, which work according to the Gastechnik system, have been in operation all the time and will continue to be operated.

The plant at Heidelberg has been enlarged by one more unit of the same type to keep in step with the increased performance of the desulphurisation plant.

Only a few days ago we received from the technical manager of the works the gratifying information that the stills of V2A steel (the oldest of which has meanwhile seen 5 years of uninterrupted service) do not show any signs of corrosion.

The third extraction plant using perchlorethylene was erected during the war.

This plant has been closed down for the present for various reasons which have, however, nothing to with corrosion.

Dr. Sexauer, Dr. Bär,
Gastechnik G.m.b.H.

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Dear Sir,

In summarising the information available on sulphur reducing and oxidising bacteria in relation to gasholders, the article by Mr. B. E. Purkiss ('GAS JOURNAL,' August 3, 1960) is of very real service. However, in his enthusiasm for a particular line of approach, i.e., bactericides, it is possible that insufficient credit may have been given to established methods. These have been proved, by many years of experience, to afford complete protection against the contamination of gas by $H_2S$ formed bacterially, and in some circumstances they may afford greater safety than do bactericides.

In this connection we would comment on the method depending on the addition of zinc oxide emulsion to the water. At first sight this might be regarded as depending on precipitation only but, in effect, it combines both precipitation and starvation, and avoids the disadvantages of either method operating alone. When bacterial action begins to show in a freshly filled gasholder tank, heavy dosage with zinc oxide emulsion is started (supplemented with zinc acetate where an instant response is necessary).

An important feature in securing the best results is the method of feeding-in the emulsion. It should be delivered inside the holder by a steam jet; conveniently, through a U-shaped pipe discharging near the surface of the water inside the gasholder. The zinc suspension thus arrives warm at the water surface and tends to remain as a surface layer, forming a 'blanket' over the contaminated water beneath. In this way effective control over gas contamination can be maintained and there is no need for a holder to be out of service for several months while the bacteria are consuming the sulphate, as is necessary in the barium chloride precipitation method of applying starvation.

When bacterial activity declines, due to exhaustion of the sulphates, the sulphur will be present as zinc and iron sulphides in the sludge at the tank bottom. However, there may still be a chance of traces of hydrogen sulphide being released into the gas, especially when inversion of the water occurs in the autumn. To guard against these traces a small content of soluble zinc (3 ppm.) should be maintained at all times in the water. Bactericides alone will not deal with sulphides formed prior to their use and must, in such cases, be supplemented by zinc treatment.

The article suggests that the soluble zinc is, in fact, a saturated solution of zinc sulphide, which would, of course, be useless for precipitating further hydrogen sulphide. In support of this view a figure of 6.9 ppm. is quoted for the solubility of zinc sulphide in water. It may be noted that this value is only one of several widely differing figures that have been reported, and some of these are less than one hundredth of the value quoted. We therefore consider that published solubility figures for zinc sulphide are no guide to the nature of the soluble zinc.

On the practical scale, it is our experience that on occasions when a slight deficiency of zinc has been added to a 'dirty' holder, no trace of soluble zinc is detectable in the water by the most sensitive colorimetric test. From this it would appear that the solubility of zinc sulphide, under the conditions existing in gasholder tanks, must be very much less than 1 ppm. A positive small amount of soluble zinc is therefore a guarantee of the absence of free hydrogen sulphide from the water, and prevents unexpected contamination of the gas.

For a newly commissioned holder, or a reconditioned one, filled with water from a source low in sulphate, the bactericide treatment is the more attractive, and when fully proved by experience will, presumably, become standard practice. But for existing holders which are known to contain considerable sulphide sludge and which have been kept free from hydrogen sulphide by zinc treatment a change to the bactericide method could increase the risk of gas contamination. Only longer experience with the latter method can decide this point.

W. F. GARDNER,
Senior Chemist,
South Eastern Gas Board.
Central Laboratories,
709, Old Kent Road,
London, S.E.15.

## PERSONAL NOTES

MR. A. J. M. HENSHAW, has been appointed Assistant Managing Director of W. C. Holmes & Co. Ltd. Mr. Henshaw was previously a director and general sales manager. MR. B. J. DUNCAN, has been appointed Sales Manager. Previously Mr. Duncan was field sales manager.

COUNCILLOR E. R. HOLBORN of Edmonton, London, and COUNCILLOR G. B. WEST of Waltham Cross, have been appointed members of the Eastern Gas Consultative Council.

COUNCILLOR D. J. O'NEILL, of Sheffield, and COUNCILLOR R. WILKINSON of Louth have been appointed members of the East Midlands Gas Consultative Council.

## COMING EVENTS

**November 22.**—I.G.E., LONDON AND SOUTHERN SECTION: Caxton Hall, Westminster, S.W.1. 'Oil Refinery Operations and Refinery Gas Production,' by G. R. Storey.

**November 22.**—THE INSTITUTION OF CHEMICAL ENGINEERS, NORTH WESTERN BRANCH: Chemical Engineering Lecture Theatre, The Manchester College of Science and Technology, Jackson Street, Manchester. 'New Developments in the Bulk Supply of Chemical Reagents.' 3.30 p.m.

**November 23.**—THE COMBUSTION ENGINEERING ASSOCIATION, NORTHERN REGION: Birmingham. 'The Factory Acts in Relation to Boilers and Pressure Vessels.'

**November 24.**—INSTITUTION OF PLANT ENGINEERS, SHEFFIELD AND DISTRICT: Grand Hotel, Sheffield. 'The Introduction of Planned Maintenance Systems,' by A. F. Stedman. 7.30 p.m.

**November 24.**—LONDON AND SOUTHERN JUNIORS: Visit to W. H. Allen, Sons & Co. Ltd., Bedford.

## OBITUARY

SIR ERNEST WOODHOUSE SMITH, C.B.E., a former Director-General of Gas Supply, Ministry of Fuel, and from 1947 to 1957 chairman of the Industrial Coal Consumers' Council, has died at Effingham, Surrey, at the age of 76. Born on February 13, 1884, and educated at Arnold School, Blackpool, and the Victoria University of Manchester, he was in 1929 appointed technical adviser to the gas area committee of the Board of Trade. From 1943 to 1945 he was president of the Institute of Fuel and president of the Smoke Abatement Society from 1954 to 1956. He was knighted in 1947.

MR. H. C. GRAY has died at the age of 85. Until his retirement in 1945, Mr. Gray was the representative in Scotland for John Wright & Co. Ltd., (a member of the Radiation Group), whom he joined in 1907.